DARK ENERGY SURVEY

BCS Star Flats

Douglas Tucker, DES-Calib Telecon, 4 Feb 2009

BCS:

- Blanco Cosmology Survey
- NOAO Survey Program (2005-2008)
- Blanco 4m telescope + Mosaic II Imager
- 100 sq deg in two 50 sq deg fields
- PI: Joe Mohr
- Data processed through the DES DM system

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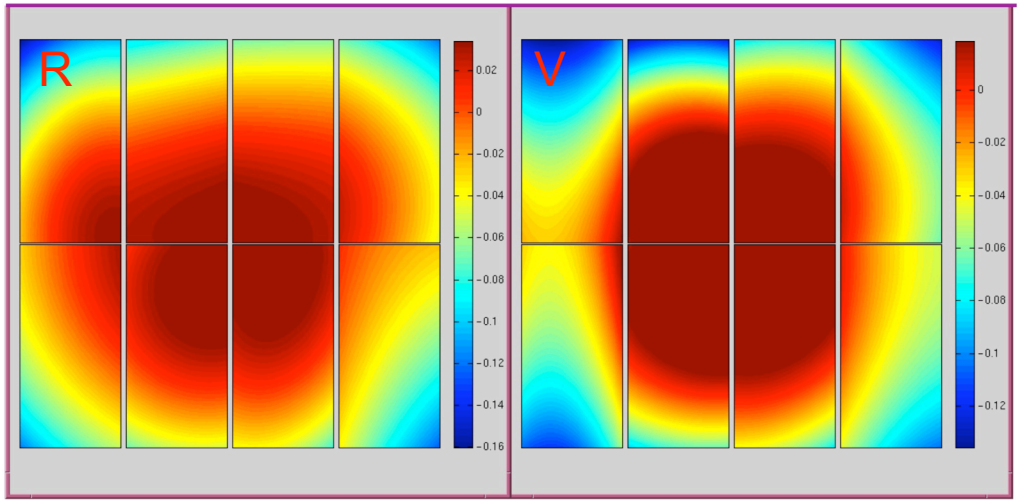
Star Flats:



Koch et al. 2004, ESO WFI star flats based on SDSS Stripe 82 observations (2nd order polynomial fits)

- Due to vignetting, stray light, and/or geometric distortion, a detector's response function differs for point sources (e.g., stars and distant galaxies) and extended sources (e.g., the sky background)
- Standard flat fields (domes, twilights, skies) may flatten an image sky background well, but not the stellar photometry
- The solution: star flats (Manfroid 1995)
  - offset a field (like an open cluster) multiple times and fit a spatial function to the magnitude differences for matched stars from the different exposures
  - can also just observe a well-calibrated field once (Manfroid 1996)

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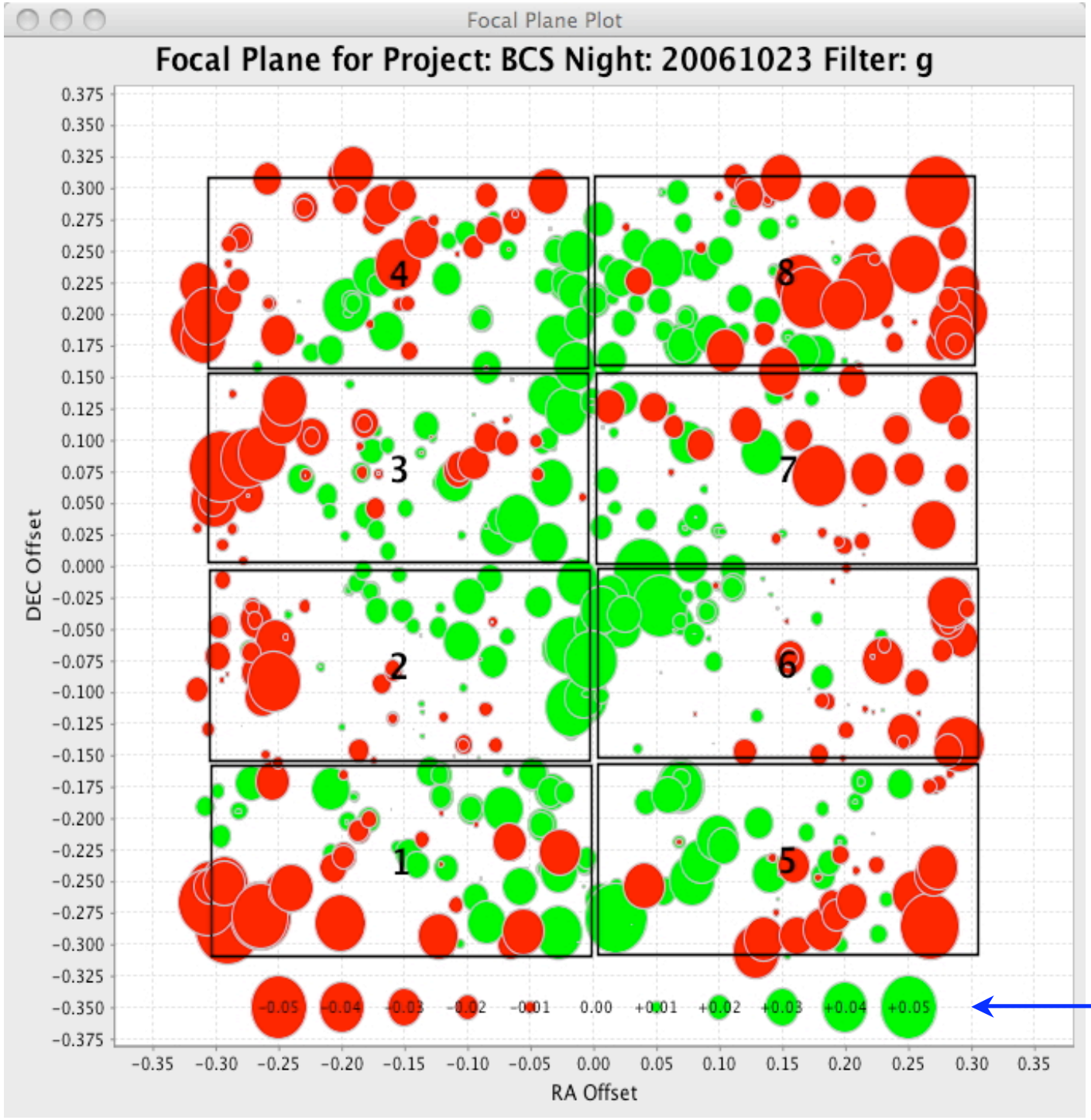
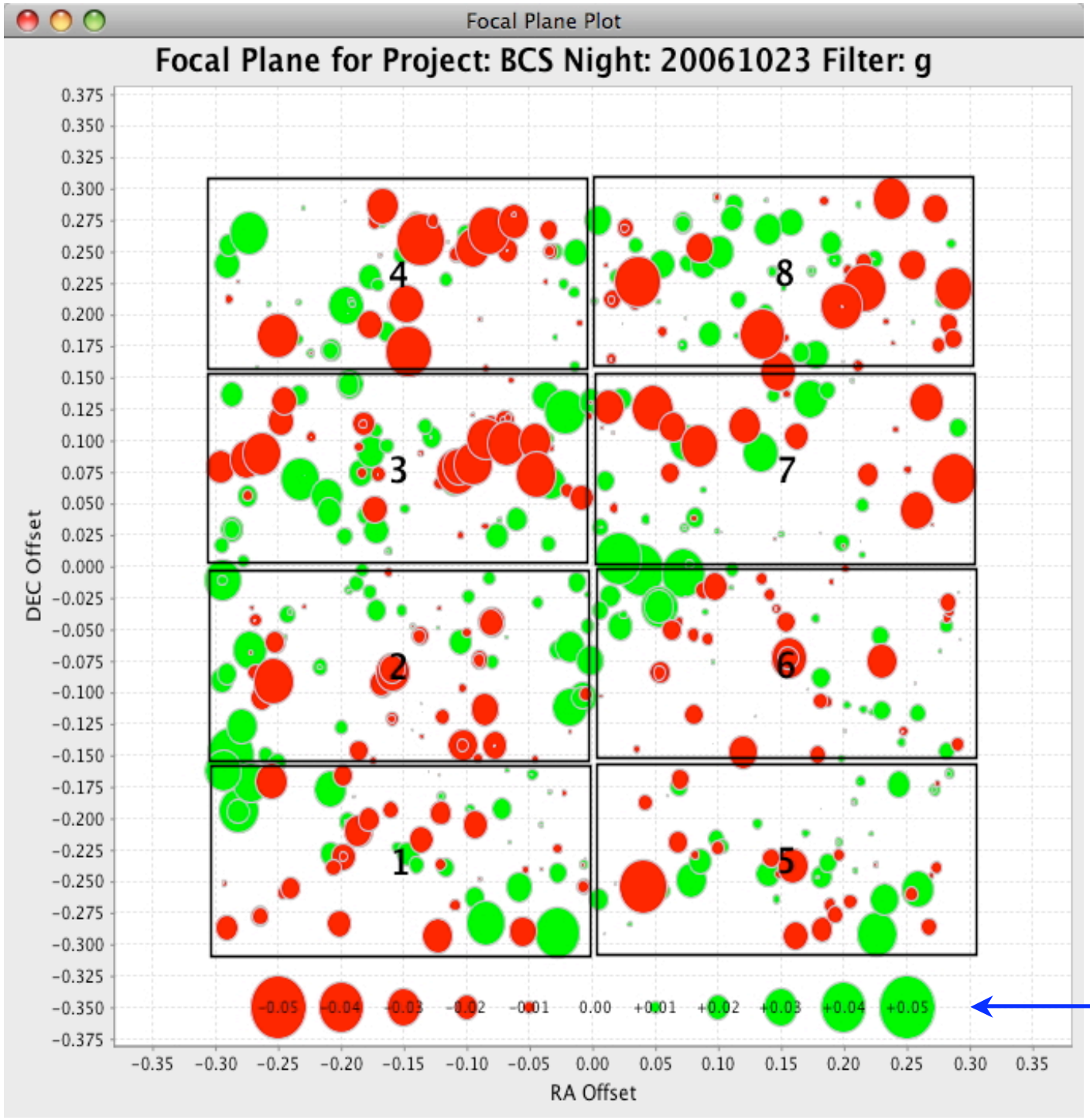
BCS Star Flats (prototype):

- Fit photometric equation for a (photometric) night
  - SDSS Stripe 82 + Smith et al. Southern u'g'r'i'z' standards
- Calculate and plot residuals of above fit as a function of x,y position over the Mosaic II field-of-view
  - Use just the residuals from the SDSS Stripe 82 data from that night, since it is 2.5deg-wide and fully covers the Mosaic II field-of-view
- Fit the residuals to a 2D function F(x,y)
- F(x,y) is the star flat



- "REDUCED" data
  - "Flat" sky
  - Non-flat photometry

Legend



- "REMAPPED" data (geometric distortions removed via SWARP)
  - Non-flat sky
  - Flat photometry

Legend